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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/701,534	11/30/2000	Shunichi Seki	107291	5481
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OLIFF & BERRIDGE, PLC P.O. BOX 19928 ALEXANDRIA, VA 22320			EXAMINER CLEVELAND, MICHAEL B	
			ART UNIT	PAPER NUMBER

1762

DATE MAILED: 04/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/701,534

Applicant(s)

SEKI ET AL.

Examiner

Michael Cleveland

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 February 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 15 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Winkler et al. ("Through-Bond Interactions in Silicon-Phosphorus and Silicon-Arsenic Compounds..." *Chemistry—A European Journal*, 3, 874-880.)

Winkler teaches methods of synthesizing compounds such as  $\text{Si}_6\text{H}_{12}\text{P}_2$  (compound 1a, see p. 875). The compounds are synthesized in liquids (Experimental, p. 879). Liquids are ink-jet printable.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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5. Claims 1-4, 13-14, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yudasaka et al. (U.S. Patent 5,989,945, hereafter '945) in view of Taniguchi et al. (U.S. Patent 5,667,572, hereafter '572).

Claims 1, 13, 14, and 22: '945 teaches a method for forming a silicon film for a device such as a thin film transistor (Abstract) comprising:

applying a coating solution (i.e., an ink composition) containing a silicon compound onto a substrate (col. 14, line 60-col. 16, line 16; Abstract). The solution may be deposited by ink-jet printing (col. 20, lines 35-40). The solution may contain  $\text{Si}_3\text{H}_8$  (col. 14, lines 60-67).

'945 is described above, but does not explicitly teach using inks with the claimed surface tensions and viscosities. In fact, '945 is silent as to the viscosity and surface tension of the ink. Accordingly, one of ordinary skill in the art would have been motivated to have looked to the related prior art to determine operable viscosities and surface tensions for ink jet inks.

'572 teaches that ink jet inks (col. 1, lines 7-10) may usefully have viscosities of 1-10 cP and surface tensions of 25-70 dyn/cm (col. 9, lines 11-31). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used such values as the particular values of the viscosity and surface tension for the ink of '945 with a reasonable expectation of success because '572 teaches that such viscosities and surface tensions are useful in ink jet printing.

Claim 2: The solution coating may take place under an inert atmosphere (col. 16, lines 29-31).

Claim 3: The solvent is evaporated (i.e., removed) after deposition (col. 14, lines 4-12) and the film is pyrolyzed (col. 15, lines 10-26).

Claim 4: The silicon film may be crystallized by laser treating to form a crystalline film (col. 15, lines 6-26).

6. Claims 8, 10-12, 17, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yudasaka '945 in view of Taniguchi '572 as applied to claim 1, and further in view of Kotaro et al. (JP 06-191821, hereafter '821).

'945 and '146 are described above, but do not explicitly teach using a silane with at least 5 silicon atoms, using a hydrocarbon solvent with a vapor pressure in the claimed range, or a silane concentration within the claimed range.

Claims 8 and 17: '945 teaches the use of disilane, trisilane, or tetrasilane, but not pentasilane (col. 14, lines 60-67). '821 teaches the equivalence of forming silicon films by applying liquid solutions of silanes, such as disilane, trisilane, tetrasilane, pentasilane, or hexasilane [0006]. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used pentasilane instead of the silanes of '945 with the expectation of similar results and with a reasonable expectation of success because '821 demonstrates that it is useful for the same purpose.

Claims 10-11 and 19-20: '945 teaches the use of an alcohol solvent (col. 14, lines 4-12), but not a hydrocarbon with a vapor pressure at room temperature of 0.001-50 mmHg. However, '821 teaches other solvents that are suitable for depositing solution of silanes to form silicon films, such as ethylbenzene [0008], a hydrocarbon with a vapor pressure of approximately 10 mmHg at room temperature (See CRC Handbook of Chemistry and Physics, 47<sup>th</sup> edn., Weast, R.C., ed., p. D-125.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used ethylbenzene instead of an alcohol as the solvent with a reasonable expectation of success and with the expectation of similar results because '821 teaches that ethylbenzene is a suitable solvent for depositing such silanes.

Claims 12 and 21: '945 does not teach concentrations of the silane in the solution. Therefore, one of ordinary skill in the art would have been motivated to have looked to the related art to have determined operative concentrations. '821 teaches that the silane concentrations may be 0.1-50 % by weight. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have chosen a weight percent, such as 0.1 weight percent from within the claimed range with a reasonable expectation of success because '821 demonstrates that such concentrations are operative for depositing such silanes.

7. Claims 1-4, 13-14, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yudasaka et al. (WO97/43689, hereafter '689) in view of Taniguchi '572 for substantially

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the same reasons given above (WO97/43689 is the international application from which '945 matured.).

Claims 8, 10-12, 17, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yudasaka '689 in view of Taniguchi '572 and Kotaro et al. (JP 06-191821, hereafter '821) for the same reasons given above relating to Yudasaka '945 in view of '572 and '821.

### ***Double Patenting***

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

**Note: Double patenting rejections based on the same patent with different secondary references have been grouped together under a single paragraph number.**

9. Claims 15, 16, and 18 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 4, 6, and 9 of U.S. Patent No. 6,527,847. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the patent are within the genus of the applications claims.

Claim 6 of '847 requires a silicon compound of the formula  $\text{Si}_n\text{X}_m\text{Y}_l$  and a solvent thereof (i.e., a liquid, and therefore an ink). Claim 6 differs from that of claims 15 and 18 because the claimed values of  $n$ ,  $m$ ,  $l$ , and the implicit values of  $n+l$ , overlap but are not identical to those of the corresponding values  $a$ ,  $b$ ,  $c$ , and  $a+c$  in the present claims. Therefore, the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the

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invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

Likewise, present claim 16 differs from the claims of '847 because it requires a combination of a  $\text{Si}_n\text{X}_m$ , wherein  $n$  may be  $m$ , and  $\text{Si}_a\text{X}_b\text{Y}_c$ . Patented claim 1 requires an ink of  $\text{Si}_n\text{X}_n$  in a solvent and patented claims 6-7 teach  $\text{Si}_a\text{X}_b\text{Y}_c$  with overlapping values of  $a$ ,  $b$ , and  $c$  (see discussion of claim 15 above). Patented claim 7 teaches that combinations of the silicon compounds are usable together. It has long been held that "It is *prima facie* obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art." In *Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the compositions of patented claims 1 and 6 because combination of equivalents has long been held to be *prima facie* obvious and because the claims of '847 suggest combining its compositions.

Claims 6, 7, and 9 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 4, 6, and 9 of U.S. Patent No. 6,527,847 in view of Yudasaka '689. '847 states that the composition is a coating composition, but the claims do not suggest a method of applying the composition. Yudasaka '689 teaches depositing silane coating compositions by ink-jet printing. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used ink-jet printing as the particular method of applying with a reasonable expectation of success because Yudasaka '689 teaches that ink-jet printing is a successful method of depositing silane precursors.

Claims 1-4, 8, 12-14, 17, and 21-22 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 4, 6, and 9 of U.S. Patent No. 6,527,847 in view of Yudasaka '689 and Taniguchi '572. '847 states that the composition is

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a coating composition, but the claims do not suggest a method of applying the composition. Yudasaka '689 teaches depositing silane coating compositions by ink-jet printing. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used ink-jet printing as the particular method of applying with a reasonable expectation of success because Yudasaka '689 teaches that ink-jet printing is a successful method of depositing silane precursors. The features of claims 2-4 have been discussed with regard to Yudasaka above.

Claims 10-12 and 19-21 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 4, 6, and 9 of U.S. Patent No. 6,527,847 in view of Yudasaka '689 and Taniguchi '572 as discussed in this section and in view of Kotaro et al. (JP 06-191821, hereafter '821) for the teachings of Kotaro regarding solvent characteristics discussed above.

10. Claims 1, 3, 8, 12-14, 17, and 21-22 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 and 15 of U.S. Patent No. 6,503,570 in view of Taniguchi '572.

Claim 1: Claim 15 of '570 teaches a method of forming a silicon film comprising ink-jet printing a compound of the formula  $\text{Si}_6\text{H}_{12}$ . Claim 15 is otherwise broader than present claim 1 except that it does not claim ink-jet surface tensions. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07. Taniguchi '572 renders surface tensions of ink-jet inks of 25-70 dyn/cm obvious for the reasons already discussed.

Claims 3, 8, 12, 14, 17, and 21 recite the composition and overlapping features of claims 1 and 6-8.

Taniguchi '572 also renders the viscosities of claims 13 and 22 obvious.

Claims 2 and 4 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 and 15 of U.S. Patent No. 6,503,570



and Taniguchi '572, as applied to claims 1 and 14 above, and further in view of Yudasaka '689. The claims of '570 do not specify an atmosphere. Yudasaka '689 teaches forming silicon coatings by depositing silane coating compositions by ink-jet printing in an inert atmosphere. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used an inert atmosphere as the particular atmosphere of the claims of '570 with a reasonable expectation of success because Yudasaka '689 teaches that inert atmospheres are appropriate for the operation. The teachings of Yudasaka '689 regarding crystallizing silicon are relevant to claim 4 for the reasons discussed above.

Claims 10-11 and 19-20 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 and 15 of U.S. Patent No. 6,503,570 and Taniguchi '572, as applied to claims 1 and 14 above, and further in view of Kotaro '821 for its teachings regarding solvent characteristics already discussed above.

### ***Response to Arguments***

11. Applicant's arguments filed 2/10/2004 have been fully considered but they are not persuasive.

The rejections of claims 14 and 17 under 35 USC 102(b) over Hirai '146 are withdrawn because Hirai '146 does not explicitly teach the surface tension of the liquid silane precursors.

Applicant argues that Winkler does not teach the use of its liquids in ink-jet printing as recited by the claim. In response to applicant's argument that Winkler does not disclose the use of an ink-jet ink, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). The discoverer of a new use must protect his discovery by means of method claims, not product claims. *In re Hack*, 114 USPQ 161. Thus, the argument is unconvincing because claims 15 and 18 are directed to a composition, not a method. Winkler anticipates the claim because it teaches

the claimed composition features and because as a liquid, it is capable of performing the intended use recited by the preamble.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant argues that Yudasaka does not teach the claimed surface tensions. The argument is unconvincing because it does not address the teachings of Taniguchi.

Applicant argues that Yudasaka is directed to TFT production using polycrystalline silicon, and that Applicant's claims are not directed to such. The argument is unconvincing because Yudasaka achieves their goal by ink-jet printing silicon precursors. Applicant's failure to claim the features recited by Yudasaka does not disguise the teachings of Yudasaka that are relevant to the claims. The Examiner notes that Applicant's specification states that the invention is of use in forming thin film transistors (p. 1).

Applicants arguments regarding Hirai have been considered but are moot in view of the new ground(s) of rejection.

Applicant argues that there is no motivation to combine Kotaro with the other references. The argument is incorrect because the selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07. Kotaro is cited merely for its teachings regarding suitable decomposable silanes and suitable solvents and weight percents for solutions of such silanes.

Applicant argues that Taniguchi is not directed to silicon-containing hydrogen compounds. The argument is unconvincing because it does not address the teachings of Yudasaka.

Applicant argues that there is no motivation to combine Taniguchi with the other references. The argument is incorrect because the selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP

2144.07. Taniguchi is cited merely for its teachings regarding suitable surface tensions and viscosities for ink-jet inks.

Applicant argues that the currently claimed subject matter is not taught by the claims of '847 and '570. The argument is unconvincing because it does not address the teachings of the secondary references. Applicant argues that the claims of '847 recite a coating composition rather than a method of application. The argument is not commensurate in scope with the present claims directed to compositions. The argument is not convincing regarding the method claims because it does not address the teachings of Yudasaka and Taniguchi (and Kotaro). Applicant argues that Matsuki '570 fails to specify a particular atmosphere. The argument is only commensurate in scope with claim 2, and is unconvincing because it does not address the teachings of Taniguchi and Yudasaka.

Applicant argues that the Examiner has not followed the procedure set forth in MPEP 804(II)(B)(1) in detail. The Examiner disagrees but offers further explanation stated above. The argument is also convincing because it fails to comply with 37 CFR 1.111(b) because it amounts to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Applicant points out that Matsuki '847 and Matsuki '570 are not commonly owned. However, there is a common inventor, and therefore the double patenting rejections must be maintained. See MPEP 804 I.A. and Chart II-B.

### ***Conclusion***

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cleveland whose telephone number is (571) 272-1418. The examiner can normally be reached on Tuesday-Friday and alternate Mon, 8-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Michael Cleveland  
Patent Examiner  
April 19, 2004